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THE SOLITARY BEES OF BARRO COLORADO ISLAND, CANAL ZONE

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This account of the bees of Barro Colorado Island is based primarily on specimens collected by members of the American Museum on successive visits to the island. Cognizance has also been taken of previously published records of the apifauna of Barro Colorado and of the records in the card catalogue of The Institute for Research in Tropical America. In several instances allusion has been made also to specimens collected in other parts of the Canal Zone or Panama by members of the American Museum, members of other institutions, or independent collectors.

In view of the persistence with which collections have been made on the island the number of known solitary bees, as distinguished from social or colonial bees, is small. The relatively restricted representation of these bees is perhaps explainable in part by the nature of the island. Bees, with certain exceptions, are more partial to the open country than they are to woodland, and except for a few small, widely separated clearings, aggregating only a few acres, Barro Colorado is a continuous stretch of tropical forest. As Dr. Frank M. Chapman has well said, "it is forested from end to end and bottom to top." Another factor that has limited collecting is the relative paucity of plants on the forest floor that bees might visit, most of the bloom being on the inaccessible forest roof. Finally, collections have been made only at certain times of the year, and doubtless the life cycle of some of the solitary bees of the island is so adjusted that they make their appearance in the adult form over only a limited period. A bee that emerges solely during July would not be seen by a collector visiting the island in November or December. Almost certainly there must be many more solitary bees than are here recorded. Nevertheless the list may not be unwelcome, at least as a nucleus.

In a subsequent paper consideration will be given to the social bees (Meliopnidae) that have been collected on Barro Colorado Island. Of these, for reasons suggested in that paper, the representation is relatively much more complete.

In the bibliographies that precede each of the species considered, the references have been confined to the original description, to occa-

sional cases of synonymy, and to previous reports of the presence of the insect in question either in Panama or in the Canal Zone.

Unless stated to the contrary, all of the specimens here reported upon were collected on Barro Colorado Island.

Colletes spiloptera Cockerell

Colletes spiloptera COCKERELL, 1917, Entomological News, p. 363.

Colletes (*Ptilopoda*) *maculipennis* FRIESE, 1921, Stettiner Entomologische Zeitung, LXXXII, p. 83.

Four males collected by C. H. Curran on Dec. 22, 1928, Dec. 23, 1928, Dec. 28, 1928, Jan. 3, 1929; three females, of which one was collected by C. H. Curran on Jan. 28, 1929 and two were collected by F. E. Lutz on March 5, 1933, on the clearing about the Laboratory.

Both Cockerell's *spiloptera* (described from Porto Bello, Panama) and Friese's *maculipennis* (described from San José, Costa Rica) were based on the male. It seems that *maculipennis* is probably a synonym of *spiloptera*. The female of *spiloptera* hitherto undescribed, has much the same general appearance as the male, but differs structurally in its shorter malar space (rather less than one-third as long as wide contrasted with one-half as long as wide in the male) and by its shorter antennae, which when extended backward are approximately level with the base of the tegulae, whereas those of the male reach the base of the scutellum. Joint 3 of the antennae of the female is approximately as long as joints 4 and 5 combined. In both sexes the four basal joints are black and the subsequent joints black above; in the female, however, joints 5–12 are ferruginous below, in the male joints 12 and 13 are wholly black. The female, like the male, has long fringes on the under side of the femora. The punctation of the abdominal tergites, particularly tergites 1 and 2, is much less heavy in the female than in the male.

In all of these respects the differences between the two sexes of *spiloptera* parallel those of the closely related *punctipennis*, of which there is a small series before me from Chichen Itza, Yucatan, donated by E. Thompson. The maculations on the wings of the specimens of *spiloptera* from Barro Colorado are rather stronger than those of *punctipennis* from Yucatan.

Ptiloglossa fulvo-pilosa (Cameron)

Megacilissa fulvo-pilosa CAMERON, 1903, Trans. Amer. Ent. Soc., XXIX, pp. 237–238 (Panama, on Pacific side).

One male, Jan. 7, 1929, collected by C. H. Curran.

The specimen corresponds structurally and in most of its more super-

ficial characters with the description of Cameron but differs in one or two details. The lower inner orbits are black, not yellow, although the black chitin is almost concealed by exceedingly dense, fulvous pile. It is possible that the concealing character of this fulvous pile led Cameron to believe the area yellow. The center of the mesonotum of the present specimen is densely covered with hair like the rest of the mesonotum, and it seems possible that the bare, shiny area on the mesonotum referred to in Cameron's description may have been due to wear or injury. Such a differentiated median area is at variance with the condition in perfect specimens of *Ptiloglossa* and the closely related *Caupolicana* that I have examined, although in damaged specimens this area frequently shows a more or less denuded condition.

Augochlora seminigra Cockerell

Augochlora seminigra COCKERELL, 1897, Trans. Amer. Ent. Soc., XXIV, pp. 144-145.

One female, Dec. 26, 1928, collected by C. H. Curran, and one female, March 22, 1933, collected by H. F. Schwarz.

Augochlora quiriguensis Cockerell

Augochlora quiriguensis COCKERELL, 1928, Psyche, XXXV, p. 181 (Barro Colorado Island).

The specimen recorded by Cockerell from Barro Colorado had "the mesothorax black with green margins, to this extent agreeing with the variety *sidaefoliae* Cockerell. It is intermediate between the typical form and the variety."

Augochlora fulgidana isthmii, new subspecies

FEMALE.—Agrees with typical *fulgidana* (originally described by Friese, 1921, as *fulgida*) both in sculpturing and coloration, except that the head, like the mesonotum, is for the most part copper-red (green in typical *fulgidana*), while tergites 1–4 are black, with slight greenish reflections at their sides, and tergites 3–4 likewise reflect green just in front of their broad, smooth, hairless and fringeless, black apical rims (in typical *fulgidana* tergites 1–4 are copper-red except for the black apical rims).

One female, Dec. 1, 1930, collected by H. F. Schwarz. Type in American Museum.

The specimen on which this description is based has been compared with a specimen from San José, Costa Rica, which bears Friese's type label.

The unusual coloration of this subspecies is suggestive of the *Augochlora* from Ecuador that Friese (1925, Stett. Ent. Zeit., LXXXVI, Heft 2, p. 6) described as *cupraria*, but *isthmii* does not accord fully,

either in its sculpturing or in the color of its hairs, with Friese's description of *cupraria*. Moreover, in the same paper in which *cupraria* is described, Friese draws comparison between what he describes as *atropilosa* and his *fulgidana*. It seems likely, therefore, that had his *cupraria* been as closely related to his *fulgidana* as *isthmii* is to *fulgidana*, he would not have neglected in describing *cupraria* to allude likewise to *fulgidana*.

The outer calcarium on the third tibiae of *cupraria* is described by Friese as bent at the tip. In *fulgidana* and its subspecies *isthmii* this calcarium is likewise sharply bent at its apex and ultra microscopically ciliate. The clypeus is rather produced and depressed just before the broadly rounded apical edge.

The abdomen of this subspecies seems to be rather like that of Cockerell's *bodkini*.

Augochlora (Oxystoglossa) thalia Smith

Augochlora thalia SMITH, 1879, 'Descriptions of new species of Hymenoptera in British Museum,' p. 46.

One female collected, March 4, 1933, by H. F. Schwarz.

I have not seen Smith's type of *thalia* from Brazil, but the description applies well to the present insect. The specimen also approximates in many respects *Augochlora aztecula* Cockerell, of which the American Museum has a series from Brownsville, Texas. The present insect and *thalia*, like Cockerell's *cordiaefloris*, have all of the tibiae and tarsi ferruginous, whereas in *aztecula*, as a rule, it is only the front tibiae (and not the middle and hind tibiae as well) that are red.

Augochlora (Paraugochloropsis) auriventris Friese

Augochlora auriventris FRIESE, 1921, Stett. Ent. Zeit., LXXXII, p. 87.

One female, Nov. 13, 1923 (F. E. Lutz); one male, Dec. 23, 1928, two females, Jan. 8, 1929 and Feb. 18, 1929, collected by C. H. Curran; one female, Dec. 1, 1930, collected by H. F. Schwarz.

A female was collected also by F. E. Lutz on the Chiva Chiva Trail, Nov. 18, 1923.

Augochlora (Paraugochloropsis) vesta barro-coloradensis, new variety

FEMALE.—Differs from the typical form, which has the "head and thorax golden green," and from the variety *terpsichore*, which has the head and thorax blue-green, in having the front, vertex, and mesonotum of a green strongly tinged with copper.

Abdominal tergites 2–4 are a coppery red, as described for the typical form, but the two apical segments are black with black hairs in contrast to the fulvous hairs over

tergites 1–4; tergites 1–2 have fulvous fringes along their apex, as indicated for *terpsichore*. The legs are dark, with greenish reflections. The hair on the coxae, trochanters, and femora is pale. On the outer side of the tibiae and tarsi dark hairs predominate. The hairs on the under side of the middle and hind basitarsi incline to golden. Length, 7½ mm.; length of fore wing, including tegula, 6½ mm.

One female, Jan. 10, 1929, collected by C. H. Curran. Type in American Museum.

The specimen on which the above description is based contrasts with those from other regions in the Canal Zone, which presumably are either typical *vesta* or the variety *terpsichore*. The head and thorax of these specimens appear to be pure green but in certain lights have bluish reflections. The tergites of some of them are brassy green, tinged with coppery red after the manner of some of Cockerell's specimens of *cupreola*, whereas others have the tergites entirely coppery red except for the two black apical tergites. The localities in the Canal Zone represented by these specimens are:

Balboa, June 19, 1914, Aug. 21, 1914, Oct. 4, 1914, Oct. 21, 1914, Nov. 15, 1914 (T. Hallinan), Nov. 7, 1923 (F. E. Lutz); Empire, Jan. 6, 1914 (T. Hallinan); Las Cruces Trail, near Corozal, Sept. 19, 1915 (T. Hallinan); Corozal, Jan. 3, 1929 (C. H. Curran) and Nov. 17, 1930 (H. F. Schwarz); Chiva Chiva Trail, Nov. 18, 1923 (F. E. Lutz).

Augochlora (Odontochlora) mülleri Cockerell

Augochlora mülleri Cockerell, 1900, Proc. Acad. Nat. Sci. Philadelphia, LII, pp. 361, 367.

One female, Nov. 13, 1923 (F. E. Lutz); two females, Dec. 1, 1930 (H. F. Schwarz); and four females, March 4–6, 1933 (H. F. Schwarz).

Females were collected also on Chiva Chiva Trail, Nov. 24, 1930 (H. F. Schwarz) and at Pacora, March 9, 1933 (H. F. Schwarz).

Augochlora (Odontochlora) smaragdina Friese

Augochlora smaragdina Friese, 1916, Stett. Ent. Zeit., LXXVII, p. 312.

One female, March 22, 1933, collected by H. F. Schwarz.

Females were taken also at Balboa, Aug. 20–21, 1914 (T. Hallinan), and on the Culebra-Arrijan Trail, Jan. 1, 1915 (T. Hallinan).

This species was described by Friese from San José, Costa Rica. There are in the American Museum collection two females from San Mateo, Costa Rica, dated July 7, 1920 and May, 1921, respectively, which Friese had identified as *smaragdina* and to which he has attached type labels. These specimens, which have the rank of metatypes, agree

with the specimens here designated *smaragdina* but depart from the description of *smaragdina* in one or two details. The principal point of departure is that both the San Mateo specimens and the Canal Zone specimens have very narrow black apices to the abdominal tergites, whereas, according to Friese, *smaragdina* differs from *graminea* partly because of the absence of such black rims in *smaragdina*. I am assuming that the San Mateo specimens, notwithstanding this seeming discrepancy, are sufficiently close to the holotype to be considered true *smaragdina*. If so, it should be noted that *smaragdina*, like *mülleri*, belongs to that division (*Odontochlora*) of *Augochlora* that has a spine at the base of the under side of the abdomen, and that the tuft of brown hairs which, according to Friese, occurs on the sides of tergite 6 is even more conspicuously developed on the sides of tergite 5.

Augochlora (Odontochlora) nigrocyanea Cockerell

Augochlora nigrocyanea Cockerell, 1897, Trans. Amer. Ent. Soc., XXIV, p. 144.
Augochlora nigrocyanea Cockerell, 1928, Psyche, XXXV, p. 181 (Ancon).

One female was collected by F. E. Lutz on Nov. 13, 1923.

Females have been collected also in other localities of the Canal Zone as follows: Balboa, Nov. 11, 1914 (T. Hallinan), and Nov. 7, 1923, at a yellow "morning glory" (F. E. Lutz); Chiva Chiva Trail, March 11, 1933 (H. F. Schwarz). Males were collected at Balboa by T. Hallinan on Oct. 15, 1914 and on Aug. 20, 1915.

There is great variability in the development of the spine at the base of the venter. In some specimens (including the one from Barro Colorado) it may even be lacking. As this spine is a subgeneric character in *Odontochlora*, one would be tempted to consider the insects lacking this character as distinct if they were not connected by intergrades with the heavily spined specimens.

Megalopta fornix panamensis Cockerell

Megalopta fornix var. *panamensis* Cockerell, 1919, Proc. U. S. Nat. Mus., LV, p. 207 (Trinidad Rio, Panama; Boquete, Chiriqui, Panama; and Paraiso, Canal Zone).

Megalopta fornix var. *panamensis* Friese, 1926, Stett. Ent. Zeit., LXXXVII, pp. 133–134 (repeats description and locality records of Cockerell, 1919).

Megalopta fornix panamensis Cockerell, 1928, Psyche, XXXV, p. 181 (Barro Colorado Island).

Megalopta fornix panamensis Rau, 1933, 'Jungle bees and wasps of Barro Colorado Island,' p. 185 (Barro Colorado Island).

Two females, Nov. 22–23, 1930, collected by H. F. Schwarz; two females, Nov. 27, 1930, collected by E. I. Huntington; eleven females,

Feb. 26 to March 21, 1933, and one male, March 18, 1933, collected by F. E. Lutz.

All of these specimens were taken at light either at the Laboratory or at the house of Dr. F. E. Chapman on the laboratory clearing of Barro Colorado Island. The specimen reported in Mr. Rau's book was "found in the laboratory at six A.M. on September 22."

Considerable variability occurs among the individuals of this relatively large series. Vachal (1904, Misc. Ent., pp. 113–114) in his key to what he classifies as "*Halicti megalopti*" gives as one of the characters of his *fornix* a six-spined condition of the calcaria. Cockerell (1919, Proc. U. S. Nat. Mus., LV, p. 207) does not mention the number of spines on the calcaria of his *fornix panamensis*. An examination of the series before me indicates that the number of spines varies from 4 to 7, with 5 spines the more usual condition. There are even several cases of asymmetry, 4 spines occurring on the posterior calcarium of one of the hind legs and 5 spines on the posterior calcarium of the opposite hind leg, or 5 spines on the posterior calcarium of one of the hind legs and 6 spines on the posterior calcarium of the other.[1]

In some of the specimens there is an angulation on the under side of the cheeks that suggests the feeble beginnings of the strongly developed tubercle or stout obtuse spine characteristic of what has here been identified as *Megalopta genalis*. The sculpturing of *M. fornix panamensis* is very similar to that of the specimen identified as *genalis*, even to the inclusion of the characteristic basal area of the median segment. Although Meade-Waldo states in the case of his *genalis* that "joint 3 of antennae is hardly longer than joint 4," the specimen of what I believe to be *genalis* does not differ greatly in the proportions of its antennal segments from *fornix panamensis*. Looked at from the side where joint 3 is shortest, the difference in length between joints 3 and 4 is not great, but looked at from the side where joint 3 is longest, the relative length as between joints 3 and 4 distinctly favors joint 3.

The size of the females of *fornix panamensis* in the series before me varies from 10½ to 13 mm. as against 10½ to 12 mm. in the case of the two females on which Cockerell's description was based. Even the individuals of maximum size in the present series fall far short of the 17 mm. indicated by Vachal for typical *fornix*.

[1]Comparable variability is found in the genus *Augochlora*. Schrottky (1909, Deutsch. Ent. Zeit. p. 481) restricted Cockerell's *Augochloropsis* to Augochlora-like bees that have only three spines on the hind calcarium of the third tibiae, established the subgenus *Tetrachlora* somewhat diffidently for those *Augochlora* that have four spines on this calcarium, and, because of the frequent variability in the number of the spines in excess of four, lumped all *Augochlora* having from 5 to 7 spines in the subgenus *Paraugochloropsis*. Other writers, too (for instance Cockerell, 1906, in Canadian Entomologist, XXXVIII, p. 162) refer to asymmetry in the number of the spines in *Augochlora*.

Several of the females were bearing pollen. The pollen grains, although all of pale hue, were of at least four different types, indicating that these bees do not favor a single flower. The pollen grains on one of the bees were globular and semitransparent; on a second bee globular and semitransparent but of much smaller diameter; on a third bee transparent, oval in outline, flattened, with microscopic sculpturing; on a fourth powder-like and dull white.

Megalopta genalis Meade-Waldo

Megalopta genalis Meade-Waldo, 1916, Annals and Mag. Nat. Hist., (8) XVII, pp. 452, 453–454 (Bugaba, Panama).

One female, collected by F. E. Lutz, March 23, 1933, at light, near the Laboratory.

The specimen agrees with the description of Meade-Waldo except in the following details. Meade-Waldo states that the number of spines on the posterior calcarium of the third pair of legs is 4, whereas the present specimen has 6 spines on this calcarium—approximating the condition in Friese's *armata* from Ecuador, which in other respects also seems very similar. The fact that *fornix panamensis* varies greatly in the number of spines on the calcaria leads me to think that a similar range of variability may occur in *genalis*.

The second point of difference is in the relative length of the hind tibiae and hind basitarsi, which, according to Meade-Waldo's description, are of equal length. In the specimen from Barro Colorado the hind tibiae are distinctly longer than the hind basitarsi, agreeing in this respect with all the species of *Megalopa* that I have had a chance to examine. It seemed barely possible that an error had crept into Meade-Waldo's description respecting the relative length of the hind tibiae and hind basitarsi and I accordingly requested Mr. Robert B. Benson, of the British Museum, to examine the type of *genalis* with reference to the proportions of these joints and other details. Mr. Benson has kindly written me as follows:

> In reply to your letter of the 2nd June, I have examined Meade Waldo's type of *Megalopta genalis*. The comb on the calcaria of the hind tibia appears to me to have five spines on the left leg and six on the right leg, that is including the apical spine. The posterior tibia is certainly longer than the metatarsus (2.9 mm. and 2.2 mm.). There are several specimens of this species that have been added to the collection later from Colombia, Gorgona Island, 1 ♀ July 1924, 1 ♀ October 1924, Miss L. F. Cheesman; 1 ♀ July 1924, 2 ♀ ♀ October 1924, Miss C. Longfield.

Thus, differences that existed between Meade-Waldo's description and the Barro Colorado specimen have been reconciled through an examination of Meade-Waldo's type.

Xylocopa fimbriata Fabricius

Xylocopa fimbriata Fabricius, 1804, 'Syst. Piez.,' p. 340.

Xylocopa fimbriata Cheesman, 1929, Trans. Entom. Soc. London, LXXVII, p. 144 (Taboga Is.).

Xylocopa fimbriata Rau, 1933, 'Jungle bees and wasps of Barro Colorado Island,' p. 185 (Barro Colorado Island).

Rau enumerates this bee in his account of the bees and wasps of Barro Colorado.

In the American Museum collections there are females of this species from Ancon, Nov. 21, 1923, and Taboga Island, Nov. 23, 1923, collected by F. E. Lutz.

Xylocopa splendidula Lepeletier

Xylocopa splendidula Lepeletier, 1841, 'Histoire Nat. des Insectes, Hyménoptères,' II, p. 190.

Xylocopa splendidula Rau, 1933, 'Jungle bees and wasps of Barro Colorado Island,' p. 185 (Barro Colorado Island).

This species was collected by Rau in September.

Ceratina laticeps Friese

Ceratina laticeps Friese, 1921, Stett. Ent. Zeit., LXXXII, p. 88.

One female, March 6, 1933, collected by H. F. Schwarz.

This insect accords with one of Friese's type specimens of *laticeps* from San José, Costa Rica.

Ceratina sublaticeps, new species

Female.—Identical with *laticeps* Friese except that the two enormous teeth on the under side of the head, characteristic of *laticeps*, are reduced to spines of moderate size that are not hollowed out or shovel-like anteriorly and are mostly rust-red instead of black. The large tubercles on the apical edge of the labrum, a conspicuous character in *laticeps*, are in *sublaticeps* much reduced and scarcely to be differentiated from the horseshoe-shaped rim of which they form a part. A rust-red linear maculation, absent in *laticeps*, traverses the lower part of the clypeus transversely, interrupted at the middle by the large, pale yellow maculation.

One female, Jan. 10, 1929, collected by C. H. Curran. Type in American Museum.

Further collecting may establish whether *laticeps* and *sublaticeps* are merely extremes connected by intermediates. Yet it is perhaps significant that Friese, who in 1920 obtained large numbers of *laticeps* from San José, Costa Rica, in his description based on these specimens, does not indicate variability within *laticeps*.

Friese's *crassiceps* seems to be a fairly close relative of *laticeps* and *sublaticeps*.

Ceratina mexicana zeteki, new subspecies

FEMALE.—Differs from *mexicana* in having only a relatively small oval spot on the clypeus where typical *mexicana* has a median maculation that extends from apex nearly to base, this median maculation in the case of typical *mexicana* being flanked by two semidetached smaller spots. The subspecies *zeteki*, like typical *mexicana*, is for the most part "black slightly tinged with bronze," but its genae, unlike those of typical *mexicana*, reflect a strong metallic green. The posterior part of the scutellum, the postscutellum, and the basal part of the metathorax of *zeteki* also reflect green, especially when viewed from behind. On the sides of the face of *zeteki* there is a roseate to copper-green reflection and the unmaculated parts of the clypeus reflect purple. There is a rust-colored spot at the apex of the scape. The tergites are almost wholly blackish, the apical ones with a subdued, very dull green reflection, not "golden at the tip" as in typical *mexicana*.

One female, Dec. 30, 1928, collected by C. H. Curran and named in honor of Mr. James Zetek, whose zealous and untiring efforts on behalf of Barro Colorado Island have earned the gratitude of every visitor to its shores.

Ceratina azteca Cresson is a close relative of *mexicana* and its subspecies *zeteki*. However, *azteca* lacks the maculations on the apex of the front femora and the base of the front tibiae that characterize *mexicana* and *zeteki* and it is somewhat more strongly (though still very finely) punctured on tergite 1. In *zeteki* this tergite is polished and in *mexicana* virtually so, the traces of punctation being exceedingly faint. *Ceratina azteca* has a greater prevalence of blue-green than has *zeteki*. These comparisons are based on an examination of the types of *mexicana* and *azteca* in connection with the present subspecies.

Ceratina laeta Spinola

Ceratina laeta SPINOLA, 1841, Ann. Soc. Ent. France, X, p. 138.
Ceratina laeta SMITH, 1861, Trans. Ent. Soc. London (3) I, p. 40 (Panama).

Two females were collected, Dec. 23, 1928, by C. H. Curran and one female was collected, Dec. 3, 1930, by H. F. Schwarz at the Rear Light House on Barro Colorado.

Females were collected by T. Hallinan from other localities in the Canal Zone as follows: Empire, Aug. 30, 1914; Culebra-Arrijan Trail, Dec. 20, 1914; Culebra, Dec. 21, 1914; Ancon, Jan. 28, 1916 and Feb. 3, 1916.

In addition a male was taken at Las Sabanas, near Panama City, Nov. 17, 1923, by F. E. Lutz. This male accords with Friese's description of that sex (1916, Stett. Ent. Zeit., LXXVII, p. 322). *Ceratina viridula* Smith, which Cockerell (1928, Psyche, XXXV, p. 176) has

reported from Taboga Island, seems to be very closely related to Spinola's *laeta*, but Smith's description of the male of *viridula* makes reference neither to a maculation at the base of the mandibles nor to another, though smaller maculation, at the inferior extremity of the sides of the face—both of these maculations being present in the *laeta* male as interpreted by Friese. The male from Las Sabanas has two widely separated, acute black spines at the middle of the apex of the penultimate sternite, not mentioned in Friese's description.

The male of *cobaltina*, as Cresson indicates, has "the apical segment obtusely bidentate at tip"; in the male of *laeta* as conceived by Friese and in the male of *viridula* this segment is entire. I have examined the type of *cobaltina* and find that the basal area of tergites 2–3 of *cobaltina* (that area that Cresson speaks of as having "a golden reflection in certain lights" but that under other light conditions is rather dark-colored) has longitudinal plicae of irregular length in contrast to the condition in *laeta*, which has these basal areas mostly smooth with a few punctures but no plicae.

Centris lanipes Fabricius

Apis lanipes Fabricius, 1775, 'Syst. Ent.,' p. 386.
Centris lanipes Fabricius, 1804, 'Syst. Piez.,' p. 360.

One female, March 5, 1933, collected by F. E. Lutz.

Two females were collected also at Pacora, Panama, on March 19, 1933, by H. F. Schwarz.

It is difficult to decide from the brief description given by Fabricius whether his *lanipes* is indeed the insect that Friese interprets it to be. Smith's *tarsata*, which Friese (1900, Annalen k. k. naturhist. Hofmuseums, XV, p. 313) regarded merely as a variety of *lanipes*, was reported from Barro Colorado by Cockerell.

Centris labrosa Friese

Centris labrosa Friese, 1899, Termész. Füzetek, XXIII, p. 44.

One female, collected Nov. 15, 1930, by E. I. Huntington.

This specimen is only 11½ mm. long and might seem, therefore, to be assignable to the variety *simplex* rather than to true *labrosa*, which is described as being 14–16 mm. in length. However, the hairs of the mesonotum and of the scutellum are dark-tipped as in the typical variety, and the specimen has accordingly been placed with true *labrosa*.

Females were collected also at Corozal, Jan. 16, 1929, and Jan. 21, 1929, by C. H. Curran.

Centris labrosa variety **simplex** Friese

Centris labrosa var. *simplex* FRIESE, 1899, Termész. Füzetek, XXIII, p. 44.

One female, collected Nov. 29, 1930, by H. F. Schwarz.

Just as the specimens from the Canal Zone of true *labrosa* are smaller than specimens from other regions, so the Barro Colorado example of the var. *simplex* falls below the specifications of size given for that variety by Friese. Indeed in stature it is rather like *lanipes*, being only 10 mm. in length instead of 12–13 mm. as noted in Friese's description. Its thoracic hairs correspond in coloration with those of the variety *simplex*.

Specimens of *simplex* from other localities in the Canal Zone are more nearly of orthodox size. These localities include Balboa, June 28–29, 1914 (T. Hallinan), and Empire, Aug. 30, 1914 (T. Hallinan).

Centris proxima Friese

Centris (*Rhodocentris*) *proxima* FRIESE, 1900, Annalen des k. k. naturhist. Hofmuseums, XV, pp. 243, 307.

Centris proxima COCKERELL, 1919, Proc. U. S. Nat. Mus., LV, p. 190 (Alhajuela, Panama).

Four males, Feb. 27, 1933 (F. E. Lutz), one female, March 6, 1933 (H. F. Schwarz), and one female, March 7, 1933 (F. E. Lutz).

Regarding the four males collected on Feb. 27, Dr. Lutz has the following field note:

"A *Centris* was buzzing about the end of a folded banana leaf. In sweeping the net to catch it (about 4:30 P.M.) I hit the leaf and was surprised to find that I had caught four or five. Apparently they had gone in there to sleep."

The males are even smaller than those reported by Crawford (1906), being about 13 mm. in length; the female is between 16 and 17 mm.

Centris inermis gualanensis Cockerell

Centris inermis gualanensis COCKERELL, 1912, Annals and Mag. Nat. Hist., (8) IX, p. 568.

One female, March 7, 1933, collected by F. E. Lutz.

The specimen is slightly smaller than the specimens on which Cockerell's description is based (about 15 mm. instead of about 17 or 18) and the labrum lacks a dark apical spot. However, the forelegs and middle legs are largely dark and in other respects, too, the specimen accords with Cockerell's description. Typical *inermis* has been reported by Cockerell from Red Tank in the Canal Zone (1928, Psyche, XXXV, p.

173), and a specimen assignable to the variety *gualanensis* was collected by T. Hallinan at Balboa on Nov. 6, 1916.

Centris poecila Lepeletier

Centris poecila Lepeletier, 1841, 'Histoire Nat. des Insectes, Hyménoptères,' II, pp. 154–155.

Centris poecila Gribodo, 1893, Bull. della Soc. Ent. Italiana, XXV, pp. 267–268 (Chiriqui, Panama; description of the male).

Centris poecila Cockerell, 1928, Psyche, XXXV, p. 173 (Red Tank, Canal Zone).

One female, March 15, 1933, collected by H. F. Schwarz.

This species has been collected also at the following localities in the Canal Zone: Balboa, April 21, 1914, June 12, 1914 (male), and June 12, 1915, by T. Hallinan; Farfan, May 8, 1915, by T. Hallinan.

Centris tarsata Smith

Centris tarsata Smith, 1874, Annals and Mag. Nat. Hist. (4) XIII, p. 371.

Centris tarsata Cockerell, 1928, Psyche, XXXV, p. 173 (Barro Colorado Island).

A specimen, collected by N. Banks on July 23, 1924, is recorded in the catalogue of the Laboratory.

Melitoma fulvifrons marginella (Cresson)

Melissodes? marginella Cresson, 1872, Trans. Amer. Ent. Soc., IV, p. 282.

One male, Dec. 23, 1928 (C. H. Curran).

Tetrapedia calcarata Cresson

Tetrapedia calcarata Cresson, 1878, Trans. Amer. Ent. Soc., VII, p. 136.

One female, Nov. 13, 1923 (F. E. Lutz) and one female, Dec. 12, 1928 (C. H. Curran).

In Cresson's description no mention is made of two rather faint, narrow, longitudinal stripes of dull yellow that are traceable on the mesonotum of the type and are present also in the Barro Colorado specimens and in specimens from Guatemala. In a series from Guatemala of the closely related *Tetrapedia abdominalis* Cresson these thoracic stripes are lacking. *Tetrapedia calcarata* also has the axillae maculated, whereas in *abdominalis* the axillae are black.

Other localities in the Canal Zone where this species has been collected are: Ancon, March 4, 1914 (T. Hallinan), and Culebra-Arrijan Trail, Nov. 29, 1914 (T. Hallinan).

Tetrapedia lugubris Cresson

Tetrapedia lugubris Cresson, 1878, Trans. Amer. Ent. Soc., VII, p. 135.

One male, Jan. 7, 1929, collected by C. H. Curran.

Cresson described the legs of *lugubris* as "simple," contrasting them with those of the male of *maura*, but as a matter of fact they are not wholly simple. An examination of Cresson's type shows that on the under side of the hind metatarsi, somewhat above the middle of the anterior edge, there is a rather strong tooth. The patch of white pubescence posteriorly on the apical tip of the hind tibiae is frequently absent, judging from a series before me from Guatemala, and the pale spots on the extreme sides of the fourth and fifth tergites of the abdomen are also, it seems, possibly the exception rather than the rule. These abdominal markings as well as the white hair patch on the apex of the hind tibiae are absent in the specimen of *lugubris* from Barro Colorado, which structurally is in agreement with Cresson's type.

I have checked with Cresson's type also a metatype of Friese's *Tetrapedia dentiventris* from San José, Costa Rica. Friese's insect agrees with Cresson's even to the inclusion of the white tibial hair patch and the abdominal markings. Friese's insect, however, is of somewhat larger size.

Osiris barro-coloradensis, new species

Female.—For the most part impunctate and shiny. Honey-colored to ferruginous with black areas.

The head black except for the broadly truncated clypeus, protuberant supraclypeal area, basal two-thirds of mandibles, labrum, scape in front, and flagellum more or less beneath—all of these areas being honey-colored. The outermost tooth of the mandible extending conspicuously beyond the succeeding tooth, which is dwarfed in comparison. The clypeus and supraclypeal area shiny, with sparse, blotchy, rather large but shallow punctures. The front rather depressed, below the level of the clypeus the supraclypeal area, and even the sides of the face, and clothed like the sides of the face fairly densely with scalelike, appressed ochraceous to olivaceous hairs. Rather similar appressed hairs clothe the cheeks. The hairs on the clypeus, labrum, and mandibles, though erect, are rather sparse, pale, and inconspicuous. A longitudinal carina extends from the middle ocellus to the summit of the supraclypeal area. Segment 4 of the antennae longer than either segment 3 or segment 5. The eyes somewhat convergent below.

The upper third of the mesopleura, the mesonotum, the axillae (in part) black; the other parts of the thorax honey-colored. The pronotum emarginate above at the middle with the area to each side of the emargination rather swollen, even tuberculate in appearance. The mesonotum with three short, impressed lines on its anterior half. The mesopleura with a few, not readily traceable, large but shallow, blotchy punctures. The hair on the mesonotum scalelike, appressed and ochraceous (similar to that of the front); erect, honey-colored, but somewhat inconspicuous hairs on the pronotum,

tubercles, and mesopleura; longer, erect, and honey-colored but more conspicuous hairs on the scutellum and the sides of the propodeum, the middle of which is bare, polished and shiny.

The legs honey-colored to ferruginous except for the following parts: hind tibiae, which grade from honey color at the base to dark brown or black at the apex; the wholly black hind basitarsi, which are oval in shape, flat on their under side, distinctly convex to swollen on their outer side, and at their broadest distinctly broader than the corresponding tibiae. The calcaria are long, honey-colored and ultramicroscopically ciliate along their inner surface. The hair of the legs is concolorous with the areas covered, black on the black parts, honey-colored on the honey-colored areas. The tarsal claws are bulbous at the base and have a V-shaped cleft; the longer arm of each claw runs to an exceedingly fine, sharp point.

The wings hyaline with pale honey-colored venation and stigma. Eight hamuli on anterior margin of hind wing.

The abdomen rather more reddish than the pale honey-colored clypeus and scutellum, of somewhat uneven hue but not suffused with black. The tergites bare, shiny, and hairless. The last sternite much produced and narrow. The long, exposed, forward-directed sting nearly attaining the apex of tergite 2. The venter with a few ferruginous hairs.

Length about 7 mm., exclusive of the sting.

One female, collected on Barro Colorado, Feb. 27, 1933, by H. F. Schwarz.

Apparently closely related to *Osiris panamensis* Cockerell and *Osiris aculeatus* Friese. It differs from the descriptions of both in having the tibial spurs of the middle and hind legs honey-colored to ferruginous, not "dark" as indicated for *panamensis* nor "black" as indicated for the calcaria of the hind leg of *aculeatus*. There are no reddish marks above each eye as indicated for *panamensis*. The mesopleura are sharply divided into a black basal region and a red apical region, whereas *panamensis* is said to have "mesothorax black" and in the case of *aculeatus* only the mesonotum of the thorax is mentioned as being black. The basitarsi of the hind legs are black, swollen, and broader than their tibiae, not of like width as noted for *panamensis* and *aculeatus*. In size the present species aligns itself with *panamensis* rather than with the larger *aculeatus*, but the mandibles are black at the apex, not unicolorous as Friese interprets the mandibles of *panamensis* to be.

Euglossa piliventris Guérin

Euglossa piliventris GUÉRIN, 1845, 'Iconographie du Règne Animal,' III de Cuvier, p. 458.

One female, Dec. 24, 1928 (C. H. Curran) and one male, Feb. 28, 1933 (H. F. Schwarz).

The hind margins of the tergites of these specimens "when seen

from a direction opposite the light" are a rich purple, approaching the condition described by Cockerell in his variety *imperialis*. However, specimens from other localities—Brazil, Bolivia, Costa Rica—also reflect purple when similarly viewed.

In the catalogue of the Laboratory on Barro Colorado Island are recorded one female, April 18, 1926, and two males, May 10, 1926, that were collected by C. T. Greene and identified by S. A. Rohwer.

Euglossa piliventris variety **imperialis** Cockerell

Euglossa (*Glossura*) *piliventris imperialis* COCKERELL, 1922, Proc. of U. S. Nat. Mus., LX, Art. 18, p. 6 (Rio Trinidad, Panama).

Euglossa piliventris imperialis COCKERELL, 1928, Psyche, XXXV, p. 173 (Barro Colorado Island).

In addition to the record published by Cockerell in 1928 there is in the catalogue at the Laboratory on Barro Colorado record of a specimen collected July 13, 1924, by N. Banks, the determination having been made at the Museum of Comparative Zoölogy.

Euglossa cordata (Linnaeus)

Apis cordata LINNAEUS, 1758, 'Syst. Nat.,' 10th Ed., I, p. 575.

Euglossa cordata SMITH, 1862, Trans. Ent. Soc. London, (3) I, p. 41 (Panama).

Euglossa cordata COCKERELL, 1922, Proc. U. S. Nat. Mus., LX, Art. 18, p. 7 (Ancon, Alhajuela, Paraiso, Taboga Island, Matico, Hernandez).

Euglossa cordata COCKERELL, 1928, Psyche, XXXV, p. 175 (Barro Colorado Island).

Euglossa cordata CHEESMAN, 1929, Trans. Entom. Soc. London, LXXVII, p. 145 (Taboga Island).

Two females collected, Dec. 24, 1928 (C. H. Curran) and March 2, 1933 (F. E. Lutz).

Females were collected also at Balboa, Jan. 23, 1914 (T. Hallinan); Farfan, June 20, 1915 (T. Hallinan); Culebra, Dec. 27, 1914 (T. Hallinan); Corozal, Jan. 21, 1929 (C. H. Curran). Males were collected at Balboa, July 17, 1914 (T. Hallinan); Patilla Point, Feb. 1, 1929 (C. H. Curran); Pacora, March 19, 1933 (H. F. Schwarz).

Euglossa variabilis mixta Friese

Euglossa variabilis mixta FRIESE, 1899, Termész. Füzetek, XXII, p. 135 (Chiriqui, Panama).

Euglossa variabilis mixta COCKERELL, 1917, Canadian Entomologist, XLIX, p. 145 (Tabernilla, Cabima, and Las Cascadas, near the Canal, Panama).

Euglossa variabilis mixta COCKERELL, 1922, Proc. U. S. Nat. Mus., LX, Art. 18, p. 6 (Rio Trinidad, Panama).

In the catalogue at the Laboratory, Barro Colorado, there is record of two females collected by C. T. Greene, May 10–12, 1926, and identified by S. A. Rohwer.

Euglossa cupreiventris Cheesman

?*Euglossa igniventris* Friese, 1925, Stett. Ent. Zeit., LXXXVI, Heft 2, pp. 29–30.
Euglossa cupreiventris Cheesman, 1929, Trans. Ent. Society London, LXXVII, p. 146 (Panama).

Two females, Feb. 26 and March 3, 1933 (F. E. Lutz). One of the specimens was collected "in the forest, near the 'Allee tree'."

This species seems to be very closely related to *Euglossa igniventris* from Costa Rica. Miss Cheesman's description of the punctation of the abdomen applies to the specimens before me rather more closely than does the description of Friese, who speaks of the abdominal punctation of his *igniventris* as "fast runzlig." But, while it is true that the apical part of tergite 1 and at least the greater part of tergite 2 is finely if densely punctured, the sides of these tergites and of the succeeding tergites are roughened, and it may be that Friese was concentrating on these lateral areas when drawing up his description. Miss Cheesman's detailed description of the thoracic punctation applies well to the present specimens.

Friese describes the coloration of his *igniventris* as blue-green (except for the reddish-golden abdomen). In the specimens before me the head, thorax, and legs are of a deeper green than the corresponding parts in Smith's *ignita* and reflect deep blue to purple in certain lights. The reverse side of the hind tibiae and hind femora is of a particularly deep purple hue (almost blackish in the case of the hind tibiae). The outer side of the hind tibiae, on the other hand, is a brassy green (more golden in most lights than the other parts and even with a trace of pink, as stated by Miss Cheesman, but in some lights there are bluish tints even over its shiny surface).

The scutellar cushion, as described for both *igniventris* and *cupreiventris*, is very minute, and a metallic red to copper-colored abdomen characterizes both of these species.

In addition to the specimens from Barro Colorado, there are in the American Museum two females of *cupreiventris* from Balboa, Canal Zone, Oct. 20, 1914, and June 27, 1915 (T. Hallinan), and one male, Nov. 5, 1914 (T. Hallinan).

In contrast to the female the male has its clypeus extensively purple and the inner orbits of the eye are bordered on their lower third by a

narrow cream-colored stripe; the stripe on the scape is more distinct than in the female. The scutellum, like that of the female, is level, not with a median longitudinal depression. In the specimen under consideration there is, curiously enough, a little tuft of erect hairs in the same position as the scutellar cushion of the female, but this unusual character may be peculiar to the individual. The four basal abdominal tergites of the male are colored like those of the female, but the three apical tergites are green.

Euglossa cyanura Cockerell

Euglossa cyanura Cockerell, 1917, Canadian Entomologist, XLIX, p. 146 (Porto Bello, Panama).

One female, Jan. 7, 1929, collected by C. H. Curran.

Euglossa (Eulaema) dimidiata (Fabricius)

Apis dimidiata Fabricius, 1793, 'Ent. Syst. Emendata,' II, p. 316.

Euglossa (Eulema) dimidiata Friese, 1899, Termész Füzetek, XXII, pp. 130, 133, 164–165 (Panama).

Euglossa dimidiata Schrottky, 1903, Revista do Museu Paulista, V (1902), pp. 585, 588, 598 (Chiriqui).

One female, Nov. 9–10, 1923 (F. E. Lutz), three females, Dec. 21, 1928 (C. H. Curran), one female, March 7, 1933 (F. E. Lutz), one male, Feb. 26, 1933 (E. I. Huntington).

In at least three of the females and in the male the hairs on the apical portion of tergite 4 incline to yellow rather than red, being only slightly warmer in tint than the yellow hairs on the apices of tergites 1–3. In this respect these specimens seem to approach Friese's variety *flavescens*, but tergites 1–3, unlike *flavescens*, are of normal width and tergites 5–6 (7) have the fox-red hairs of the typical subspecies, not the yellow hairs that distinguish *flavescens*.

In the card catalogue of the Laboratory at Barro Colorado Island there is record of two females of *dimidiata* collected May 10–12, 1926, by C. T. Greene and identified by S. A. Rohwer.

Exaerete frontalis (Guérin)

Euglossa frontalis Guérin, 1845, 'Iconographie du Règne Animal,' III de Cuvier, p. 458.

One female, March 23, 1933, collected by E. I. Huntington.

The specimen is somewhat smaller than that on which Guérin's description was based (23 mm. as against 28 mm.) and it is smaller, too, than a series of *frontalis* from Rio Caiary-Uaupes, State of Amazonas,

Brazil, Sept. 13, 1906 (H. Schmidt), in the American Museum collection. The specimen from Barro Colorado is slightly blue-green in contrast to the purer green of the Amazonas specimens, and in certain lights its reflections are purple. Nevertheless, structurally it alligns itself with *frontalis* and hence I have so designated it.

Megachile candidella Mitchell

Megachile candidella MITCHELL, 1930, Trans. Amer. Ent. Soc., LVI, pp. 167, 206.

One female, Feb. 27, 1933, collected by H. F. Schwarz.

Megachile mexicanum Cresson

Megachile mexicanum CRESSON, 1878, Trans. Amer. Ent. Soc., VII, pp. 127–128.

One female, Feb. 18, 1929 (C. H. Curran), and one male, March 3, 1933 (H. F. Schwarz).

The male is the only sex represented in the collection of Cresson's types at the Academy of Natural Sciences of Philadelphia. The male collected at Barro Colorado corresponds structurally with Cresson's male and in all other respects, too, except that (1) the legs above the apex of the tibiae are a trifle darker in hue (black rather than dark brown) in the Barro Colorado specimen and (2) there is in the Barro Colorado specimen neither pale, appressed pile on tergite 5 nor dense, appressed, cream-colored pile (described by Cresson as "pale golden yellow") on tergite 6. This pile in the Barro Colorado male is black, but the black appearance is probably a discoloration due to moisture. There are long black hairs fringing the sides of the apex of tergite 5 in Cresson's male as in the male from Barro Colorado.

The female accords closely with Cresson's description of that sex, except that the punctation of the mesonotum impresses me as moderately dense rather than as sparse; the punctation accords with that of the male allotype and with that of the male from Barro Colorado.

Megachile fossoris Smith

Megachile fossoris SMITH, 1897, 'Descriptions of new species of Hymenoptera in British Museum,' pp. 75–76.

One female, collected Feb. 27, 1933, by H. F. Schwarz.

This specimen runs to *leucocentra* in Schrottky's key to the Brazilian species of *Megachile* (1914, Revista do Museu Paulista, IX, p. 139) and checks up with Schrottky's descriptions of *leucocentra* (1909, Anales de la Sociedad Cientifica Argentina, LXV, primer semestre, p. 236, and 1914, Revista do Museu Paulista, IX, pp. 164–165). In Mitchell's key

to certain of the Neotropical *Megachile* (1930, Trans. Amer. Ent. Soc., LVI) it runs to *fossoris*. Mitchell makes Schrottky's *leucocentra* a synonym of *fossoris*, and Schrottky himself indicated (1920, Revista do Museu Paulista, XII, p. 198) that the name *leucocentra* had better be suppressed. Specimens of *fossoris* that I have been able to examine from localities in Brazil and Costa Rica have the legs fuscoferruginous after the manner of *leucocentra* rather than ferruginous as indicated by Smith for *fossoris*, which may have been slightly aberrant in this respect from the prevailing form. A specimen from Pará in the American Museum collection has been made by Friese the female of *barbatula*, which was described by Smith from the male. Whether or not this association is correct, *fossoris* is an insect of wide distribution, ranging from Paraguay and Brazil into Central America.

Megachile curvipes Smith

Megachile curvipes SMITH, 1853, 'Catalogue of hymenopterous insects in British Museum,' I, p. 187.

One male, March 15, 1933, and seven females March 6–24, 1933, collected by H. F. Schwarz.

Smith's type, a male, is not in the British Museum. A close relative of *curvipes* seems to be Smith's *barbatula*. In his description of *barbatula* Smith makes no mention of the structure of the third pair of legs, so characteristic in *curvipes*, but a male from Teffe, Amazonas, which Friese identified as *barbatula*, agrees with Smith's description of *barbatula* in the characters mentioned in that description, and in addition has the small tooth on the hind femora beneath and the curved hind tibiae characteristic of *curvipes*. The male from Barro Colorado lacks the floccus of white at the base of the hind metatarsi mentioned in the description of *barbatula* and shared by the specimen from Teffe, but its two basal abdominal segments are predominantly ferruginous as called for in the description of *barbatula*. The description of *curvipes* reads: "The intermediate tarsi behind and the posterior pair in front have a loose fringe of long white pubescence." In the Barro Colorado male these fringes are not especially developed and there are long dark hairs intermingled with the white. It may be, therefore, that the Barro Colorado insects should rank as a subspecies of *curvipes*, with some of the characters of *barbatula*, but in the absence of the type of *curvipes* it seems preferable not to attempt to draw distinctions.[1]

[1] I am indebted to Mr. Robert B. Benson of the British Museum (Natural History) for kindly examining the type of *Megachile barbatula* Smith. Mr. Benson reports: "It agrees with *M. curvipes* in all the characters you mention. The underside of the middle tibia is produced and terminates at the apex in a stout spine. On the underside of the hind femora, between the middle of the segment and the apex, there is a small tooth and the hind tibiae are also sharply curved." All of these structural characters *M. curvipes* shares with *M. barbatula*.

The females I associate with the *curvipes* male resemble in a number of ways the corresponding sex of *fossoris*, having like it quadridentate mandibles, reddened on the apical half except for the black teeth, a small triangular emargination on the apical middle of the clypeus, rather sparsely punctate clypeus medianly, fulvous hairs on mesonotum and scutellum, and ferruginous tegulae and nervures. They are to be differentiated chiefly through the following characters:

Fasciae on the apices of the abdominal tergites broad, uninterrupted and conspicuous. The last two sternites and the sides of the third sternite from the end with black hairs..... *fossoris.*

Fasciae on the apices of the abdominal tergites narrow and inconspicuous, overlaid by thin fringes of black hairs. The last three sternites and the sides of the fourth sternite from the end with black hairs..... *curvipes.*

Megachile totonaca Cresson

Megachile totonaca Cresson, 1878, Trans. Amer. Ent. Soc., VII, p. 117.

One female, March 18, 1933, collected by F. E. Lutz; eleven females, Feb. 27–March 24, 1933, collected by H. F. Schwarz; one male, Feb. 27, 1933, collected by H. F. Schwarz.

In describing the female Cresson says: "Pubescence of thorax black, except a slight admixture of white on each side of prothorax above." There is considerable variability in the extent of the white hairs in the case of the Barro Colorado specimens, some corresponding to Cresson's specifications, others having a band of white hairs extending the length of the pronotum, supplemented by a small patch of white hairs on the mesopleura slightly below the tegulae, and sometimes a further patch at the side of the thorax between the tegulae and the axillae. Furthermore, there is variability in the proportion of black hairs to light in the ventral scopa. Some specimens agree with Cresson's description in having "black at sides of basal segments," while others have this black border extending to the apical segments as well. Mitchell (1930, Trans. Amer. Ent. Soc., LVI, p. 166) separates *proserpina* from *totonaca* by the proportion of black hairs to white in their respective ventral scopas. In the discussion of *proserpina* he states (p. 187) that *proserpina* may possibly be only a color variety of *totonaca*.

As the male of *totonaca* has not before been recorded, I offer the following description:

Male.—Black, like the female, but with the front legs orange-colored except for the coxae and the under side of the trochanters, the middle legs largely orange-colored on the femora and tibiae and lower tarsal joints, and the hind legs, while mainly dark, nevertheless of a dull orange color on the femora and tibiae within and on the lower

tarsal joints. The mandibles deep blood-red except for the black base and black apical teeth.

The patches of white hair contrasting with the otherwise black hair are even more numerous and conspicuous than in the female and as sharply circumscribed. The clypeus, sides of face, and front to just above the median ocellus is covered with rather long creamy-white hairs that conceal or nearly conceal the sculpturing. The dense brushlike patch of straight long hairs on the under side of each cheek near the lower end is snow white in contrast to the short and inconspicuous dull gray hairs on the upper two-thirds of the cheek. On the thorax white hair patches occur below the tegulae, below the hind pair of wings, and just behind the tegulae, but extended over the pronotum and on the lower half of the pleura and under side of the thorax are hairs that are gray. Patches of white hair occur on the lateral extremities of tergites 1–4 but are conspicuous only on tergite 1. The apical tergite is covered fairly densely with appressed pale hairs in addition to a few thin erect hairs and there are pale hair bands on the three apical sternites. The hair on the under side of the front trochanters and femora is yellow, that on the outer surface of the front femora and on the front basitarsi above whitish. Rather spinelike yellowish-brown hairs fringe the anterior margin of the front tibiae. The broad, dense fringe along the posterior margin of the front tarsal joints is a light amber color with the tips of the hairs black. A much shorter fringe of whitish hairs partly overlays this much more conspicuous fringe. The hairs on the middle legs very long on the under side of the joints and for the most part white; the hairs on the under side of the hind coxae, apical part of tibiae, and basal part of femora similarly long and white. The tarsal joints on their inner surface with hairs of light golden color. All the other hairs are black.

The punctation on the vertex is denser than in the corresponding region of the female, and it is a little denser (although still relatively sparse) also on the mesonotum and scutellum. The mandibles are tridendate, although the middle tooth has a slight irregularity or subdivision (possibly an individual difference). On the basal half of the inferior margin of the mandible is a triangular projection, and the lower end of the cheeks is grooved. The lateral ocelli are about equidistant from the eye and the hind margin of the head. The antennae, when backward extended, do not reach the base of the scutellum. The first joint of the flagellum is barely longer than the pedicel and only about half the length of the second.

The front coxae have two long and rather straight, forward-directed, deep brown spines the tips of which are armed with a needle-fine point. The basitarsus of the front legs is about as long as the front tibia. This basitarsus, like the two succeeding tarsal joints, is expanded scalelike on the anterior side, its pointed extremity ending slightly beyond the base of the third tarsal joint. The expansions of tarsal joints 2–3 are rather long and fingerlike, pointing diagonally downward, with the result that the tip of the "finger" of the second tarsal joint approaches the apex of the third tarsal joint. The long, dense fringe along the posterior margin of the front tarsi has already been referred to. There is a much less developed fringe of diagonally down-slanting, reddish hairs along the anterior border of the front basitarsus.

Considerably smaller than the female, only about 10 mm.

The male seems to be in a number of respects rather like Strand's *Megachile fumicosta*.

Hypanthidium aureocinctum panamense (Cockerell)

Hypanthidium panamense Cockerell, 1913, Annals and Mag. Nat. Hist., (8) XII, p. 105 (Gatun, Canal Zone).

Hypanthidium panamense Schwarz, 1927, Amer. Mus. Novitates, No. 253, p. 17 (Barro Colorado Island).

Hypanthidium aureocinctum panamense Schwarz, 1933, Amer. Mus. Novitates, No. 625, pp. 7–9.

Females of this species were collected by F. E. Lutz, Nov. 13, 1923.

Dianthidium currani Schwarz

Dianthidium currani Schwarz, 1933, Amer. Mus. Novitates, No. 624, pp. 13–16 (Barro Colorado Island).

This is a fairly common bee on Barro Colorado Island, a number of specimens having been taken in the neighborhood of the Laboratory. In the Old World certain Anthidiinae are known to build their nests in empty snail-shells, and it is possible that the bee of similar habit to which Rau refers (1933, 'Jungle bees and wasps of Barro Colorado Island,' p. 185) is *currani*. Rau's bee did not hatch out from the cell in the snail-shell, hence identification could not be made.

Dianthidium banksi Cockerell

Dianthidium banksi Cockerell, 1928, Psyche, XXXV, p. 175 (Barro Colorado Island).

The specimen on which Cockerell's description was based was collected by Nathan Banks on June 20.

Stelis (Odontostelis) bivittatum (Cresson)

Anthidium bivittatum Cresson, 1878, Trans. Amer. Ent. Soc., VII, pp. 116–117.

Stelis (Odontostelis) bivittatum Schwarz, 1933, Amer. Mus. Novitates, No. 650 (Barro Colorado Island and Balboa, Canal Zone).

One female, March 21, 1933, collected by F. E. Lutz.

Coelioxys totonaca Cresson

Coelioxys totonaca Cresson, 1878, Trans. Amer. Ent. Soc., VII, p. 102.

One female, March 15, 1933, collected by F. E. Lutz. This specimen has been compared with Cresson's type.

Coelioxys scutigera Friese

Coelioxys scutigera Friese, 1922, Zool. Jahrb. Syst. Geog. und Biol., XLIV, pp. 430, 443.

One female, March 9, 1933, collected by H. F. Schwarz.

The specimen has a largely red tergite 1, contrary to the specifica-

tions of Friese's key, and in length attains at most 13 mm. (the upbent abdomen is hard to measure with accuracy) instead of 16 to 16½ mm. mentioned by Friese. It is possible, therefore, to consider it a local race, although, judging from Friese's description, it is identical in structural characters. *Coelioxys scutigera* was described from northern Brazil.

Coelioxys laevigata Smith

Coelioxys laevigata SMITH, 1854, 'Catalogue of hymenopterous insects in British Museum,' II, p. 269.

One male, March 16, 1933, collected by H. F. Schwarz.

I had tentatively associated the present male with the female of *scutigera*, a somewhat closely related insect, but the characters of the male of *scutigera* noted by Friese are shared only in part by the male before me, whereas there is complete accord between this male and Smith's description of the male of *laevigata*. Before me is also a female *Coelioxys* from San Mateo, Costa Rica, that Friese identified as *laevigata*. Although originally described from Brazil, *laevigata* has been reported by Friese likewise from Paraguay, Bolivia, and Ecuador.